



## CURRICULUM VITAE

Stephen J. Giovannoni

EXHIBIT

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### Education:

- University of Oregon, Ph.D. in Biology 1984
- Boston University, M.A. in Biology 1978
- University of California, San Diego, B.A. in Biology 1974

### Research Interests:

- Molecular Ecology of Oceanic and Freshwater Bacterioplankton
- Environmental Genomics
- Microbial Activity in the Oceanic Lithosphere

### Professional Experience:

- Director, Molecular and Cellular Biology Program,  
Oregon State University, Corvallis 2000
- Professor, Department of Microbiology,  
Oregon State University, Corvallis 1999-present
- Associate Professor, Department of Microbiology,  
Oregon State University, Corvallis 1993-1999
- Assistant Professor, Department of Microbiology,  
Oregon State University, Corvallis 1988-1993
- NSF Postdoctoral Research Fellow with Norman Pace,  
Indiana University, Bloomington 1984-1988
- Instructor, Department of Biology, University of Oregon, Eugene 1984
- Graduate Research Assistant with Richard Castenholz,  
Department of Biology, University of Oregon, Eugene 1979-1984
- Research Assistant with Edward Leadbetter, Biological Sciences  
Department, University of Connecticut 1978-1979
- Graduate Teaching Fellow with Lynn Margulis, Department of  
Biology, Boston University, Boston 1975-1978
- Research Assistant with George Feher, Department of Physics,  
University of California, San Diego 1973-1975

### Honors and Awards:

- Fellow, American Academy of Microbiology 1997
- Sugihara Young Faculty Research Award,  
College of Science, Oregon State University 1994
- Emerging Scholar Award, Phi Kappa Phi 1993
- NSF Postdoctoral Fellowship Award, Division of Biotic Systems  
and Resources, "Phylogenetic Analysis of Marine Picoplankton  
by rRNA Gene Cloning and Sequencing" 1986-1988
- Morgenroth Graduate Student Award, University of Oregon 1984

### Professional Service:

- Associate Editor, *Environmental Microbiology*, 2000-present
- Editorial Board of *Applied and Environmental Microbiology*, 1997-1999
- Grant Panel member, NSF Ecology division 1998

- Member of Ocean Drilling Program Deep Biosphere Planning Group 1997-present
- Chair for the Division of Systematic and Evolutionary Biology  
American Society for Microbiology 1990
- Chair Elect for the Division of Systematic and Evolutionary  
Biology of the American Society for Microbiology 1989

#### Teaching (OSU):

- Full responsibility for *Genomics and Cellular Evolution* (MB668) yearly
- Full responsibility for *General Microbiology* (MB302), 1988-1996, alternate years
- Full responsibility for *Microbial Diversity* (MB420/520), alternate years
- Full responsibility for *Microbial Diversity Laboratory* (MB421/521), alternate years 1989-1997
- Lecturer (1) in *Ocean Research Frontiers* (OCE333), televised on OSU Statewide, 1997-1998
- Lecturer in *Plant Pathogenic Bacteria* (BOT557) yearly
- Lecturer in *Aquatic Ecology* (FW/ER 507), 1998
- Lecturer (3) in *Astrobiology: Life in the Universe* (HC407)
- Lecturer (1) in *Selected Topics in Microbial Ecology* (MB666)
- Lecturer (1-2) in *Techniques in Molecular and Cellular Biology* (MCB525) yearly

#### Teaching (other institutions):

- Lecturer in *Microbial Diversity*, The Rockefeller University, Jan., 1998 and Jan. 2000
- Co-instructor in *Marine Microbial Ecology*, The Bermuda Biological Station for Research, July 1999
- Lecturer in *Microbial Phylogeny: Linkages to Processes and Biogeochemistry* (Microbiology 670/470), University of Tennessee, Feb. 1998.
- Instructor, Module Organizer, University of Southern California/ONR, Advanced Techniques Course *Molecular Biology and Biochemistry of Marine Organisms*, July 1992.
- Instructor, Marine Biological Laboratory (Woods Hole, MA) course *Molecular Probes in Marine Ecology*, summer, 1989

#### Public Outreach:

- Advisor for American of Microbiology Public Broadcasting  
Production: "Intimate Strangers, Unseen: Life on Earth" 1997-1998
- Member of Microbial Literacy Collaborative, an American Society  
for Microbiology organization dedicated to disseminating knowledge  
about microbiology to the general public 1997

#### Graduate Training:

- Major or co-advisor for four completed Ph.D.'s and five masters degrees
- Service on over 30 graduate committees

#### University Service, Past Five Years:

##### Sponsored Seminars and Symposia

- Co-organizer of Center for Gene Research and Biotechnology Annual Retreat, Sept. 23-24, 1996
- Organized annual banquet (Chair of Banquet Committee), Phi Kappa Phi, 1997
- Organized Sugihara symposium *Microbial Diversity* at Oregon State University, Feb. 1996
- Initiated and organized departmental seminar series, including visit and seminar by Fran Paerl at New England Biolabs 1996-1997
- Organized Department of Microbiology Summer Research Symposium, 1996

##### University Committees

- Chair of search committee for director of the Center for Gene Research and Biotechnology, 1999 to present
- Center for Gene Research and Biotechnology Advisory Board member and representative to Research Office, 1997 to present
- Vice Provost for Research Search Committee member, 1996-1997
- Rice Endowed Chair in Entomology Search and Oversight Committee member, 1997 to present
- Chair, OSU Research Council, 1994-1996
- OSU Research Council member, 1993-1994

**Ad-hoc Manuscript Reviews:** *Nature*, *Marine Ecology Progress Series*, *Science*, *International Journal of Systematic Bacteriology*, *Limnology and Oceanography*, *Applied and Environmental Microbiology*, *Proceedings of the National Academy of Sciences U.S.A.*

**Ad-hoc Proposal Reviews:** FASEB, NSF, U.S. Environmental Protection Agency, U.S. Dept. of Agriculture, Australian Research Council

**Research Grants:**

- 1988            OSU Research Council Grant: "Chloroplast Phylogeny by 16S Ribosomal RNA Gene Sequence Analysis." \$4,000
- 1988-1989    Oregon Medical Research Foundation Grant: "Molecular Phylogeny of Two Protozoan Pathogens *Pneumocystis carinii* and *Leishmania* sp." \$10,953
- 1989-1990    National Science Foundation Grant: "*In situ* Analyses of the Distributions and Phylogeny of Cultivable and Non-cultivable Planctomycetales Using Phylogenetic Group-Specific RNA Probes." BSR-8818167 \$110,000
- 1989-1995    National Dairy Promotion and Research Board Grant: "Probes for Conserved 16S Ribosomal RNA (rRNA) Gene Sequences to Isolate *Lactococcus cremoris* from Nature." \$210,000
- 1991           National Science Foundation Grant: "*In situ* Analyses of the Distributions and Phylogeny of Cultivable and Non-cultivable Planctomycetales Using Phylogenetic Group-Specific rRNA Probes." BSR-9020477 \$75,000
- 1991           OSU Research Council Grant: "*In Situ* Microscopic Quantification of Low-copy Number Ribosomal RNA Targets by SIT Camera Image Analysis." \$4,000
- 1991-1993    National Science Foundation Grant: "Molecular Analyses of the Population Dynamics and Activity of a Newly Identified Bacterioplankton Group." OCE-9016373 \$368,460
- 1992           Oregon Advanced Computing Institute Grant: "igRNAid: An Interactive Graphics Program for Predicting the Secondary Structures of Ribonucleic Acid Molecules." 40-0140 \$19,315
- 1993-1997    Department of Energy, Ocean Margins Program Grant: "The Dynamics of Carbon Exchange in Vertically Stratified Coastal Bacterioplankton Communities." FG0693ER61697 \$386,189
- 1994           Joint Oceanographic Institutions Grant: "Genetic Evidence for Endolithic Microbial Life colonizing Basaltic glass:seawater interfaces." Co-PI with M. Fisk. \$12,000
- 1995-1998    National Science Foundation Grant: "Antarctic Lake Ice Microbial Consortia: Origin, Distribution and Growth Physiology." PP-9419423 \$109,327 to S.J.G.
- 1995-1996    OSU Research Council Grant: "The kinetics of Gene Amplification and Chimera Formation in the Polymerase Chain Reaction." \$7,973
- 1997-1999    National Science Foundation Grant: "Evidence for Endolithic Microbes in Oceanic Basalts." Co-PI with M. Fisk. OCE-9618728 \$38,350 to S.J.G.
- 1997-2000    National Science Foundation Grant: "Interactions Between Bacterioplankton Communities and Dissolved Substrates at the Bermuda Atlantic Time Series Study Station." OCE-9618571 with D. Carlson. Co-PI \$193,001 to S.J.G.
- 1997-2001    National Science Foundation Grant: "Spatial, Temporal and Phylogenetic Structure of Bacterioplankton Communities in Crater Lake, Oregon." DEB-9709012 with E. Crampton. Co-PI \$323,556
- 1998-1999    National Science Foundation Grant: "Development of Capabilities to Measure Proxies of Microbial Activity Within

Ocean Crust". BES-9729672, with James Cowen (P.I.), F. Kenig and H.P. Johnson. \$54,881 (to S.J.G.)

- 1998-2001 National Science Foundation Grant "Time-series Responses to a Mid-Ocean Ridge Volcanic Event: Juan de Fuca and Gorda Ridges" OCE-9902048, with James Cowen (P.I.). \$94,298 (to S.J.G.)
- 1998-1999 National Science Foundation Grant "Quantitative Imaging of the Smallest Bacterioplankton Cells: SAR11 at the Theoretical Limits of Light Microscopy" OCE-9816489. \$19,500
- 1999-2001 Collaborative Research on Bacterioplankton Biology and Biochemistry at the Bermuda Atlantic Time-series Station: An Oceanic Microbial Observatory. MCB-9977930. \$299,990 (to S.J.G.)
- 1999-2001 National Science Foundation Major Research Instrumentation Grant "Advanced Microbe Isolation Laboratory" OIA-9977469. \$338,940
- 1999-2001 Murdock Charitable Trust Grant: Microbe Discovery by Solid State Cytometry with Fluorescent DNA Probes. \$306,730
- 2000-2002 Oregon Sea Grant: Are Algicidal Bacteria Important in Controlling Phytoplankton Blooms in Oregon Coastal Waters? R/HAB-01. \$236,564
- 2000-2003 National Science Foundation Grant: Effects of Microbial Activity on Rates of Basalt Alteration. With co-P.I. M. Fisk. OCE-0085436. \$358,999
- 2001 Diversa Corporation Contract: High Throughput Culturing. \$75,000
- 2001-2006 National Science Foundation Proposal, pending. IGERT- The Earth's Subsurface Biosphere. Co-PI. With M. Fisk. \$2,674,860.

#### Professional Societies:

- American Society for Microbiology
- American Association for the Advancement of Science
- American Society of Limnology and Oceanography

#### Peer Reviewed Articles (published, in press, submitted, or near submission, in reverse order):

63. Cowen J., S.J. Giovannoni, H. P. Johnson, F. Kenig, D. Butterfield, M. Rappe, M. Hutnak, and P. Lam. Microbial activity in fluids from 3.5 m.y. old ocean crust. *Nature*, submitted.
62. Streamlined method to analyze 16S rRNA gene clone libraries. 2001. Vergin, K. L., Rappe, M.S. and Giovannoni, S.J. *Biotechniques* 30:938-944.
61. Urbach, E., K. L. Vergin, L. Young, A. Morse, G. Larson and S.J. Giovannoni. 2001. Unusual bacterioplankton in Crater Lake Oregon. *Limnol. Oceanogr.* 46:557-572.
60. Canolli, B. D., G. Carlsson and S.J. Giovannoni. 2000. Bacterial chromosomal painting for in situ monitoring of cultured marine bacteria. *Environ. Microbiol.* 2:654-665.
59. Rappe, M.S., Vergin, K. and Giovannoni, S.J. 2000. Phylogenetic comparisons of a coastal bacterioplankton community with its counterparts in open ocean and fresh water systems. *FEMS Microb. Ecol.* 33: 219-232.
58. Gordon, D.A., J. Priscu and S.J. Giovannoni. 2000. Origin and phylogeny of microbes living in permanent Antarctic lake ice. *Microb. Ecol.* 39:197-202.
57. Jansson, S., Bergman, B., Carpenter, E., Giovannoni, S.J., Vergin, K. 1999. Genetic Analysis of the Marine Diazotrophic Cyanobacterium, *Trichodesmium*. *FEMS Microb. Ecol.* 19:57-67.
56. Fisk, M. and S.J. Giovannoni. Sufficient conditions for a deep biosphere on Mars. 1999. *Journal of Geophysics*

55. Urbach, E., K. L. Vergin and **S.J. Giovannoni**. 1999. Immunochemical detection and isolation of DNA from metabolically active bacteria. *Appl. Environ. Microbiol.* 65:1207-1213.
54. McAshan, S.K., K.L. Vergin, **S.J. Giovannoni** and D.S. Thaler. 1999. Interspecies hybridization in the Enterococci via conjugation of chromosomal vancomycin resistance. *Microb. Drug Resist.* 5:101-112.
53. Mauel, M.J., **S.J. Giovannoni** and J.L. Fryer. 1999. Phylogenetic analysis of *Piscinickettsia salmonis* isolates by 16S ribosomal DNA sequencing. *Dis. Aquat. Org.* 35:115-123.
52. Rappé, M.S., D.A. Gordon, K. L. Vergin, **S.J. Giovannoni**. 1999. Phylogeny of Actinobacteria-related SSU rRNA gene clones recovered from marine bacterioplankton. *Syst. Appl. Microbiol.* 22:106-112.
51. Suzuki, M., M.S. Rappé, and **S.J. Giovannoni**. 1998. Kinetic bias in estimates of coastal picoplankton community structure obtained by measurements of SSU rDNA PCR-amplicon length heterogeneity. *Appl. Environ. Microbiol.* 64:4522-4529.
50. Fisk, M.R., **S.J. Giovannoni** and I. Thorseth. 1998. Alteration of oceanic volcanic glass: textural evidence for microbial activity. *Science* 281:978-980.
49. Vergin, K., E. Urbach, J. L. Stein, E. F. DeLong and **S.J. Giovannoni**. 1998. Screening of a fosmid library of marine environmental genomic DNA fragments reveals four clones related to Planctomycetales. *Appl. Environ. Microbiol.* 64:3075-3078.
48. Urbach, E., C. Schindler and **S.J. Giovannoni**. 1998. A PCR fingerprinting technique to distinguish isolates of *Lactococcus lactis*. *FEMS Microbiol. Lett.* 162:111-115.
47. Rappé, M.S., M. Suzuki, K. L. Vergin, **S.J. Giovannoni**. 1998. Phylogenetic diversity of ultraplankton plastid SSU rRNA genes recovered in environmental nucleic acid samples from the Pacific and Atlantic coasts of the United States. *Appl. Environ. Microbiol.* 64:294-303.
46. Prisco, J., C.H. Fritsen, E. Adams, **S.J. Giovannoni**, H. Paerl, C. McKay, D. Gordon, and B. Lanoil. 1998. Perennial Antarctic lake ice: an oasis for life in a polar desert. *Science* 280:2095-2098.
45. Wright, T. D., K. Vergin, P. Boyd and **S.J. Giovannoni**. 1997. A novel  $\alpha$ -Proteobacterial lineage from the lower ocean surface layer. *Appl. Environ. Microbiol.* 63:983-989.
44. Lanoil, B. D. and **S.J. Giovannoni**. 1997. Identification of bacterial cells by chromosomal painting. *Appl. Environ. Microbiol.* 63:1118-1123.
43. Suzuki, M., M.S. Rappé, Z.W. Hamberger, H. Winfield, N. Adair, J. Strope, and **S.J. Giovannoni**. 1997. Bacterial diversity among SSU rDNA gene clones and cellular clones from the same seawater sample. *Appl. Environ. Microbiol.* 63:983-989.
42. Urbach, E., B. Daniels, M. S. Salama, W. E. Sandine and **S.J. Giovannoni**. 1997. The *tdh* phylogeny for environmental isolates of *Lactococcus lactis* is consistent with the rRNA genotypes, but not with phenotypes. *Appl. Environ. Microbiol.* 63:694-702.
41. Field, K.G., N. Adair, D.A. Gordon, M.S. Rappé and **S.J. Giovannoni**. 1997. Genetic diversity and depth-specific speciation within the SAR11 cluster: a marine bacterial lineage. *Appl. Environ. Microbiol.* 63:63-72.
40. Rappé, M.S., R.F. Kemp and **S.J. Giovannoni**. 1997. Phylogenetic diversity of marine coastal picoplankton 16S rRNA genes cloned from the continental shelf off Cape Hatteras, N.C. *Limnol. Oceanogr.* 42:811-828.
39. Mauel, M.J., **S.J. Giovannoni** and J.L. Fryer. 1997. Development of immunological and culture assays for detection, identification, and differentiation of *Piscinickettsia salmonis*. *Dis. Aquat. Org.* 34:169-174.

38. Lanolli B. D., L. M. Oufettir and **S. J. Giovannoni**. 1996. The marine bacterium *Pseudalteromonas haloplanktis* has a complex genome structure composed of two separate genetic units. *Genome Res.* 6:1160-1169.
37. **Giovannoni, S. J.**, M. S. Rappe, K. L. Vergin and N. Adair. 1996. 16S rRNA genes reveal stratified open ocean bacterioplankton populations related to the Green Non-Sulfur bacteria. *Proc. Natl. Acad. Sci. U.S.A.* 93:7979-7984.
36. Gordon D. A. and **S. J. Giovannoni**. 1996. Stratified microbial populations related to *Chlorobium* and *Fibrobacter* detected in the Atlantic and Pacific oceans. *Appl. Environ. Microbiol.* 62:1171-1177.
35. Suzuki, M., and **S. J. Giovannoni**. 1996. Bias caused by template annealing in the amplification of 16S rRNA genes by PCR. *Appl. Environ. Microbiol.* 62:625-630.
34. **Giovannoni, S. J.**, M. R. Fisk, Mullins, T. D. and Furnes, H. 1996. Genetic evidence for endolithic microbial life colonizing basaltic glass/seawater interfaces. *Proceedings of the Ocean Drilling Program* 148:207-214.
33. Rappe, M. S., Kemp, P. F., and **S. J. Giovannoni**. 1995. Chromophyte plastid 16S ribosomal RNA genes found in a clone library from Atlantic Ocean seawater. *J. Phycol.* 31:979-988.
32. Salama, M. S., Musafija-Jeknic, T., W. E. Sandine, and **S. J. Giovannoni**. 1995. An ecological study of lactic acid bacteria: isolation of new strains of *Lactococcus* including *Lactococcus lactis* subspecies *cremonis*. *Journal of Dairy Science* 78:1-14.
31. Salama, S., W. Sandine, and **S. J. Giovannoni**. 1995. A milk-based method for detecting antimicrobial substances produced by lactic acid bacteria. *J. Dairy Sci.* 78:1219-1223.
30. Mullins, T. D., T. B. Britschgi, R. L. Krest, and **S. J. Giovannoni**. 1995. Genetic comparisons reveal the same unknown lineages in Atlantic and Pacific bacterioplankton communities. *Limnol. Oceanogr.* 40:148-158.
29. Salama, S., W. Sandine, and **S. J. Giovannoni**. 1993. Isolation of *Lactococcus lactis* subsp. *cremonis* from nature by colony hybridization with rRNA probes. *Appl. Environ. Microbiol.* 57:1313-1318.
28. Lovley, D. R., **S. J. Giovannoni**, D. C. White, J. E. Champine, E. Phillips, Y. A. Gorby, and S. Goodwin. 1993. *Geobacter metallireducens* gen. nov., sp. nov., a microorganism capable of coupling the complete oxidation of organic compounds to the reduction of iron and other metals. *Archiv. Microbiol.* 159:336-344.
27. Cary, S. C. and **S. J. Giovannoni**. 1993. Transovarial inheritance of endosymbiotic bacteria in deep-sea vesicomyid clams. *Proc. Natl. Acad. Sci. USA* 90:5695-5699.
26. Cary, S. C., W. Warren, E. Anderson, and **S. J. Giovannoni**. 1993. Identification and localization of bacterial endosymbionts in hydrothermal vent taxa with symbiont-specific PCR amplification and *in situ* hybridization techniques. *Mol. Mar. Biol. Biotech.* 2:251-262.
25. Liesack, W., R. Soller, T. Stewart, H. Haas, **S. J. Giovannoni**, and E. Stackebrandt. 1992. The influence of tachytelically (rapidly) evolving sequences on the topology of phylogenetic trees: intrafamily relationships and the phylogenetic position of the Planctomycetaceae as revealed by comparative analysis of 16S ribosomal RNA sequences. *System. Appl. Microbiol.* 15:357-362.
24. Lane, D. J., A. P. Harrison, Jr., D. Stahl, B. Pace, **S. J. Giovannoni**, G. J. Olsen, and N. R. Pace. 1992. Evolutionary relationships among sulfur- and iron-oxidizing eubacteria. *J. Bacteriol.* 174(1):269-275.
23. Fryer, J. L., C. N. Lannan, **S. J. Giovannoni**, and N. D. Wood. 1992. *Piscirickettsia salmonis* gen. nov., sp. nov., the causative agent of an epizootic disease in salmonid fishes. *Int. J. Sys. Bacteriol.* 42:120-126.
22. Field, R. G., S. M. Landrean, and **S. J. Giovannoni**. 1991. 18S rRNA sequences of *Leishmania enrietti* promastigote and amastigote. *International Journal for Parasitology* 21:483-485.
21. Britschgi, T. B. and **S. J. Giovannoni**. 1991. Phylogenetic analysis of a natural marine bacterioplankton community by rRNA gene cloning and sequencing. *Appl. Environ. Microbiol.* 57:1774-1778.

20. Salama, S. W., Sandine, and **S. J. Giovannoni**. 1991. Development and application of oligonucleotide probes for identification of *Lactococcus lactis* subsp. *cremoris*. *Appl. Environ. Microbiol.* 57:1313-1318.
19. Gutenberg, S. K., **S. J. Giovannoni**, K. G. Field, J. L. Fryer, and J. S. Rohovec. 1991. A phylogenetic comparison of the 16S and rRNA sequence of the fish pathogen *Renibacterium salmoninarum* to Gram-positive bacteria. *FEMS Microbiol. Lett.* 77:151-156.
18. **Giovannoni, S. J.**, E. F. DeLong, T. M. Schmidt, and N. R. Pace. 1990. Tangential flow filtration and preliminary phylogenetic analysis of marine picoplankton. *Appl. Environ. Microbiol.* 56:2572-2575.
17. **Giovannoni, S. J.**, T. B. Britschgi, C. L. Moyer, and K. G. Field. 1990. Genetic diversity in Sargasso Sea bacterioplankton. *Nature* 345:60-63.
16. Huss, A. R. and **S. J. Giovannoni**. 1989. Primary structure of the chloroplast small subunit ribosomal RNA gene from *Chlorella vulgaris*. *Nucleic Acids Res.* 22:9487.
15. Turner, S., T. Burger-Wiersma, **S. J. Giovannoni**, L. R. Mur, and N. R. Pace. 1989. The relationship of a prochlorophyte *Prochlorothrix hollandica* to green chloroplasts. *Nature* 337:380-382.
14. Weisburg, W. G., **S. J. Giovannoni**, and C. R. Woese. 1989. The *Deinococcus* - *Thermus* phylum and the effect of rRNA composition on phylogenetic tree construction. *System. Appl. Microbiol.* 11:128-134.
13. Bomar, D., **S. J. Giovannoni**, and E. Stackbrandt. 1988. A unique type of eubacterial 5S rRNA in members of the order Planctomycetales. *J. Mol. Evol.* 27:121-125.
12. Distel, D. L., D. L. Lane, G. J. Olsen, **S. J. Giovannoni**, B. Pace, N. Pace, D. Stahl, and H. Felbeck. 1988. Sulfur-oxidizing bacterial endosymbionts: Analysis of phylogeny and specificity by 16S ribosomal RNA sequences. *J. Bacteriol.* 170:2506-2510.
11. Field, K. G., G. J. Olsen, D. J. Lane, **S. J. Giovannoni**, M. T. Ghiselin, E. C. Raff, N. R. Pace, and R. A. Raff. 1988. Molecular phylogeny of the animal kingdom based on 18S ribosomal RNA sequences. *Science* 239:748-753.
10. **Giovannoni, S. J.**, E. DeLong, G. J. Olsen, and N. R. Pace. 1988. Phylogenetic group-specific oligodeoxynucleotide probes for *in situ* microbial identification. *J. Bacteriol.* 170:720-726.
9. **Giovannoni, S. J.**, S. Turner, G. J. Olsen, S. Barnes, D. J. Lane, and N. R. Pace. 1988. Evolutionary relationships among cyanobacteria and green chloroplasts. *J. Bacteriol.* 170:3584-3592.
8. Karl, D. M., G. T. Taylor, J. A. Novitski, H. W. Jannasch, C. C. Wirsen, N. R. Pace, D. J. Lane, G. J. Olsen, and **S. J. Giovannoni**. 1988. A microbiological study of Guaymas basin high temperature hydrothermal vents. *J. Deep Sea Res.* 35:777-791.
7. **Giovannoni, S. J.**, E. Schabtach, and R. W. Castenholz. 1987. *Sosphaera pallida* gen. and comb. nov., a gliding, budding eubacterium from hot springs. *Arch. Microbiol.* 147:276-284.
6. **Giovannoni, S. J.**, W. Godchaux, E. Schabtach, and R. W. Castenholz. 1987. Cell wall and lipid composition of *Sosphaera pallida*, a budding eubacterium from hot springs. *J. Bacteriol.* 169:2732-2737.
5. **Giovannoni, S. J.**, D. M. Ward, N. F. Revsbech, and R. W. Castenholz. 1987. Obligately phototrophic *Chloroflexus*: primary production in anaerobic hot spring microbial mats. *Arch. Microbiol.* 147:81-87.
4. Person, B. K., **S. J. Giovannoni**, D. L. Stahl, and R. W. Castenholz. 1985. *Heliothrix oregonensis* gen. nov., sp. nov., a phototrophic filamentous gliding bacterium containing bacteriochlorophyll *a*. *Arch. Microbiol.* 142:164-167.
3. Person, B. K., **S. J. Giovannoni**, and R. W. Castenholz. 1984. *Phys. and heliob.,* a gliding bacterium containing bacteriochlorophyll *a*. *Appl. Environ. Microbiol.* 47:578-584.
2. **Giovannoni, S. J.**, and L. Margulis. 1981. A red *Berkeleya* from Laguna El Guero, Baja California. *Microbios* 50:47-63.

1. Margulis, L., E. S. Barghoorn, D. Ashendorf, S. Banerjee, D. Chase, S. Francis, **S. J. Giovannoni**, and J. Stolz. 1980. The microbial community in the layered sediments at Laguna Figueroa, Baja, California. *Precam. Res.* 11:93-123.

#### Reviews, Book Chapters and Other Non-Peer Reviewed Publications:

10. **Giovannoni, S. J.**, M. Rappe. 2000. Evolution, Diversity and Molecular Ecology of Marine Prokaryotes. p. 47-84. *In* Kirchman, D. (ed.) *Microbial Ecology of the Oceans*. John Wiley & Sons, Inc., New York.

11. **Giovannoni, S.** and M. Rappe. 1999. Microbial Diversity: It's a New World. *The NEB Transcript* 10:1-4.

10. **Giovannoni, S. J.**, M. Rappe, D. Gordon, E. Urbach, M. Suzuki, and K. G. Field. 1996. Ribosomal RNA and the evolution of bacterial diversity. p. 63-85. *In* Roberts, D. McL., Sharp, P., Alderson, G. and Collins, M. (ed.) "Evolution of Microbial Life" Society for General Microbiology Symposium 54. Cambridge University Press.

9. **Giovannoni, S. J.**, T. Mullins, and K. G. Field. 1995. Microbial diversity in marine systems: rRNA approaches to the study of unculturable microbes. *In* "Molecular Ecology of Aquatic Microbes," ed. Ian Joint. Springer-Verlag, Berlin-Heidelberg-New York-Tokyo.

8. **Giovannoni, S. J.** and S. C. Cary. 1993. Probing marine systems with ribosomal RNAs. *Oceanography* 6:95-104.

7. **Giovannoni, S. J.**, N. Wood, and V. A. R. Huss. 1993. Molecular Phylogeny of Oxygenic Phototrophic Cells and Organelles from Small-Subunit Ribosomal RNA Sequences. Pages 159-170. *In* "Origins of Plastids," R. A. Lewin (ed.) Chapman and Hall, NY, NY.

6. Staley, J. T., J. L. Fuerst, **S. Giovannoni**, and H. Schlesner. 1991. The Order *Planctomycetales* and the Genera *Planctomyces*, *Pirellula*, *Gemmata* and *Isosphaera*. Pages 3710-3731. *In* M. Dworkin et al. (eds.) *The Prokaryotes*. Volume 4. Chapter 203. Springer-Verlag, New York.

5. **Giovannoni, S. J.** 1991. The polymerase chain reaction. Pages 177-203. *In* E. Stackebrandt and M. Goodfellow (eds.) *Modern Microbiological Methods: Nucleic Acids Techniques in Bacterial Systematics*. John Wiley and Sons, New York.

4. **Giovannoni, S. J.** and R. W. Castenholz. 1989. Genus *Isosphaera* **Giovannoni** and Castenholz. Pages 1959-1961. *In* Krieg, N. R. and J. G. Holt (eds.) *Bergey's Manual of Systematic Bacteriology*. Volume 2. Williams and Wilkins, Baltimore/London.

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1. Olsen, G. J., D. J. Lane, **S. J. Giovannoni**, N. R. Pace, and D. A. Stahl. 1986. Microbial ecology and evolution: a ribosomal RNA approach. *Ann. Rev. Microbiol.* 40:337-366.

#### Invited Lectures (1999 only):

Invited speaker, American Society for Limnology and Oceanography, Aquatic Sciences Meeting, Feb. 6-7, 1999. Titles of talks: "The Implications of Spatial and Temporal Structure in Open Ocean Bacterioplankton Communities and Dr. What We Have Learned From a Decade of Studying Picoplankton Diversity Using Molecular Techniques" and "The Application of This Knowledge to the Identification of Single Cells."

Invited speaker, International Business Conferences, World Congress Enzyme Technology, Copenhagen, March 10, 1999. Title of talk: "Microbial Life in Deep Ocean Basins."



invited speaker. American Society for Microbiology. Conference Microbial Biodiversity. Chicago. Aug. 6. 1999. Title of talk *Bacterioplankton Diversity And Ecosystem Structure in The Global Oceans*

invited speaker. National Institute of Health symposium. Washington, D.C. *Life at the Extremes. Some Like it Hot*. July 20. 1999. Title of talk *Squeezing DNA out of Rocks. Microbial Life in Deep Ocean Basalts*

invited speaker. Center for Gene Research and Biotechnology. Annual Retreat. Newport, OR. Sept. 27. 1999. Title of talk *Genomics Approaches to Microbial Diversity*

Invited speaker. Department of Energy. workshop. *Applications of Genomic Technology to Bioremediation*. Washington, D.C. Dec. 6. 1999. Title of talk *Kinetics Effects In The Amplification Of Mixed Populations of Homologs By the Polymerase Chain Reaction*

Invited speaker. Diversa Corporation. San Diego. Dec. 17. 1999. Title of talk *The Bermuda Atlantic Time-series Study. An Oceanic Microbial Observatory*